

REMARKS

Claims 1 and 32 have been amended to correct obvious typographical errors. Claim 3 has been canceled. No new matter has been added. Upon entry of this amendment, claims 1, 4-17, 19 and 21-33 are pending in the subject application.

35 U.S.C. §103 Rejection

The sole ground of rejection of the claims is under 35 U.S.C. §103(a) as obvious over McCullough, U.S. 6,555,486. Applicants respectfully contend that this rejection is improper and should be withdrawn.

1) The McCullough patent is not effective prior art

The McCullough patent cited by the Examiner was filed on July 12, 2001. Therefore, the earliest date that the McCullough patent is effective as prior art is July 12, 2001.

The instant application was filed on July 27, 2001, and claims the benefit of earlier-filed U.S. provisional application 60/222,108, filed July 28, 2000 ("the provisional application"). See, e.g., instant application at page 1, lines 8-10 (priority claim). A copy of this provisional application is attached hereto as Appendix A. Because the provisional application has a filing date earlier than the effective date of the McCullough patent, and some or all of the pending claims are entitled to the filing date of the provisional application, they cannot be rejected over the McCullough patent.

Pending claim 1 is directed to a composition for forming a thermally conductive polymeric material. The composition includes at least one thermoplastic polymeric material, a thermally conductive filler material (a carbon fiber); and at least one solvent in which the at least one thermoplastic polymeric material is at least partially soluble. Further, claim 1 recites that the length of the carbon fiber in the formed thermally conductive polymeric material is substantially the same as the length of the carbon fiber prior to adding the carbon fiber to the composition.

The provisional application provides compositions comprising a thermoplastic polymeric material (such as polyetherimide or polyphenylene sulfide, see, e.g. p.2), a thermally conductive filler including carbon fibers (see, e.g., p.2 and Table One), and

at least one solvent (including methylene chloride or N-methylpyrrolidone, see, e.g., pp. 2-3)). The provisional application also provides that the carbon fiber length in the formed thermally conductive polymeric material should not be reduced during molding (see, e.g., provisional application at p. 3 and p. 5).

As to the pending claims depending from claim 1: the provisional application discloses compositions including at least 50 - 70 wt% of filler, as required by claims 4-6 (see, e.g., provisional application at p. 2 and Table One); and compositions including a second filler material as required by pending claims 7 and 8 (see, e.g., provisional application at pp. 2-3 and Table One).

Claim 9 is directed to a thermally conductive polymeric material, comprising at least one polymeric material and at least 55 wt% of a thermally conductive filler material. Claims 10 - 16, which depend from claim 9, recite properties of the filler material, require a second filler material, or require specified amounts of filler material. These filler materials and amounts are disclosed in the provisional application as described above (see also p. 3 and Table One).

Claim 17 is directed to a method for forming a thermally conductive polymeric material, by forming a solution by at least partially dissolving a thermoplastic polymeric material in a solvent, adding a thermally conductive filler material to the solution, and removing the solvent from the solution, wherein the thermally conductive filler is a fiber and wherein the length of the fiber in the thermally conductive polymeric material is substantially the same as the length of the fiber prior to addition to the solution. This method is described in the provisional application, e.g., at p. 2, p. 5, and Table One. Claims 19 and 21-24, which depend from claim 17, recite properties of the filler material, require specified amounts of filler material, or recite that a second thermally conductive filler material is added to the solution. These features are disclosed in the provisional application as described above.

Claim 25 is directed to a solvent blending method for forming a thermally conductive polymeric material by blending a thermally conductive fibrous filler with a polymeric material, wherein the length of the thermally conductive fibrous filler after blending is substantially the same as the length of the thermally conductive fibrous filler after forming the thermally conductive polymeric material. This method is disclosed in the provisional application, e.g., as described above.

Claim 26 is directed to a method for minimizing fiber breakage when forming a thermally conductive polymeric material including forming a solution by at least partially dissolving a polymeric material in a solvent, adding a thermally conductive filler material to the solution, the thermally conductive filler material comprising fibers, and removing the solvent from the solution, wherein breakage of the fibers is minimized. This method is disclosed in the provisional application, e.g., at p. 2 and p.5. Claims 27 – 33, which depend from claim 26, recite properties of the filler material. These features, or materials having these properties, are disclosed in the provisional application as described above.

Accordingly, some or all of the pending claims are entitled to the filing date of the provisional application, and therefore the McCullough patent is not effective as prior art against the pending claims. Reconsideration and withdrawal of the rejection is requested.

2. The pending claims are not obvious over McCullough

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). MPEP 2142.

The McCullough reference suffers from several deficiencies when its teachings are compared to the pending claims. Some of those deficiencies were noted in Applicants' response to the prior Office Action, and are incorporated by reference here although not duplicated below.

Additionally, the McCullough reference describes thermally conductive *elastomeric* coatings for use in connection with heat generating electronic devices, particularly computer chips. The elastomeric material is a visible-light curable elastomeric material (see col. 4, lines 15-46). According to McCullough, the coatings

contain a thermally conductive filler. (See col. 4, lines 15-18) According to McCullough, the thermally conductive filler is preferably particles of boron nitride, but can also be alumina nitride and alumina as well as carbon materials such as carbon fiber. (See col. 5, lines 7-11).

The pending claims have been described above. Each of the pending claims recites the use of a *thermoplastic* polymeric material. There is no description or suggestion in McCullough of a composition including a thermoplastic polymeric material, as required by the pending claims. The disclosure of McCullough is limited to *visible-light curable elastomeric* materials, not thermoplastics. In fact, the McCullough reference does not mention a single example of an elastomeric material, let alone a thermoplastic material.

Moreover, one of ordinary skill in the art would not be motivated to modify the teachings of the McCullough reference so as to arrive at the claimed invention. McCullough describes a visible-light curable elastomeric material, which is desirable, according to McCullough, because the material can be cured with visible light (an “important” feature of his invention, see McCullough at col. 4, lines 30-42), and because the resulting thermally conductive material “will have much greater flexibility and compressibility” than other thermal transfer materials (also an “important” feature of his invention, see McCullough at col. 4, lines 47-55). Modifying the composition of McCullough by use of a thermoplastic material, as required by the pending claims, would result in a material that has few or none of the features deemed “important” by McCullough. In this respect at least, the McCullough reference teaches away from the compositions and methods of the present invention. See, e.g., MPEP 2143.01.

Accordingly, the McCullough reference does not render obvious any of the pending claims. Reconsideration and withdrawal of the rejection is proper and the same is requested.

CONCLUSION

Reconsideration and allowance of claims 1, 4-17, 19, and 21-33 is respectfully requested in view of the foregoing discussion. This case is believed to be in condition


for immediate allowance. Applicant respectfully requests early consideration and allowance of the subject application.

Applicants conditionally petition for an extension of time to provide for the possibility that such a petition has been inadvertently overlooked and is required. As provided below charge Deposit Account No. **04-1105** for any required fee.

Should the Examiner wish to discuss any of the amendments and/or remarks made herein, the undersigned attorneys would appreciate the opportunity to do so.

Respectfully submitted,

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